

LITHOGRAPHIC TYPE MICROELECTRONIC SPRING STRUCTURES WITH IMPROVED CONTOURS

ABSTRACT OF THE DISCLOSURE

Improved lithographic type microelectronic spring structures and methods are disclosed, for providing improved tip height over a substrate, an improved elastic range, increased strength and reliability, and increased spring rates. The improved structures are suitable for being formed from a single integrated layer (or series of layers) deposited over a molded sacrificial substrate, thus avoiding multiple stepped lithographic layers and reducing manufacturing costs. In particular, lithographic structures that are contoured in the z-direction are disclosed, for achieving the foregoing improvements. For example, structures having a U-shaped cross-section, a V-shaped cross-section, and/or one or more ribs running along a length of the spring are disclosed. The present invention additionally provides a lithographic type spring contact that is corrugated to increase its effective length and elastic range and to reduce its footprint over a substrate, and springs which are contoured in plan view. The present invention further provides combination (both series and parallel) electrical contacts tips for lithographic type microelectronic spring structures. The microelectronic spring structures according to the present invention are particularly useful for making very fine pitch arrays of electrical connectors for use with integrated circuits and other substrate-mounted electronic devices, because their performance characteristics are enhanced, while at the same time, they may be manufactured at greatly reduced costs compared to other lithographic type microelectronic spring structures.